

YEREMENKO, V.N.; HEYNISH, A.M.

Electric conductivity in binary systems of fire-resistant oxides.  
Vop.por.met. i prochn.mat. no.1:57-74 '54. (MLRA 7:12)  
(Refractory materials--Electric properties)

YEREMENKO, V. N.

9

✓ Structure and properties of titanium-chromium alloys.  
 V. N. Yermenko. *Trudy Inst. Chern. Met., Akad. Nauk SSSR*, 8, 40-66 (1957). ~~Stitch of specimens of 100-93% Ti-7% Cr and of 60-10% Ti-10-40% Cr were stabilized by heating 24 hrs. at 800° in a high vacuum and then water quenched from 700 to 1200°. Results of metallographic and dilatometric exam. are given. A eutectic transition at 715-730° was recorded corresponding to 16.6% Cr. Cr soly. in α-Ti reaches 1.8% Cr at the eutectic temp. and then decreases. An intermetallic compd. was observed in the 50-70% Cr range, but its compn. is uncertain.~~  
 J. D. Gale

sf

per

YEREMENKO, V.N.; SOLOMKO, V.P.

Dilatometric investigation of sintering one-component metal  
conglomerates. Trudy Inst.chern.met. vol.8:67-79 '54.  
(Powder metallurgy) (MLRA 7:12)

VEREMENKO, V. N., AND SOLOMKO, V. P.

Dilatometric Study of Sintering of Bicomponent Metallic Conglomerates  
Tr. In-ta chernoy metallurgii AN Ukr SSR, 8, 1954, pp 80-83

The effect of various solubility of components of bicomponent metallic conglomerates on their sintering process was studied. Cu-Ni represented a system with unlimited solubility and Cu-Mo a nonsoluble system. In the case of Cu-Mo mixture, the observed variable sintering speed, depending on the compound of the specimen, confirmed the diffusive character of sintering. Computed activation energy showed that Mo does not participate diffusive processes up to 1,000°C. (RZhFiz, No 5, 1955)

SO: Sum. No. 639, 2 Sep 55

YEREMENKO, V. N.

... metal inclusions were observed  
... specimens of the

YEREMENKO, Valentin Nikiforovich; FRANTSEVICH, I.N., redaktor; KORSAK,  
Iu.Ie., redaktor; SIVACHENKO, Ye.K., tekhnicheskii redaktor.

[Titanium and its alloys] Titan i ego splavy. Kiev, Izd-vo  
Akademii nauk USSR, 1955. 398 p. (MLRA 9:5)

1. Chlen-korrespondent AN USSR (for Frantsevich).  
(Titanium)

YEREMENKO, V.N.

LESNIK, N.D.

"The Interaction of Titanium Carbide With Cobalt", from the monograph  
Questions on Power Metallurgy and the Strength of Materials, No III,  
Institute of Metalloceramics and Special Alloys, Academy of Sciences  
Ukrainian SSR, Kiev, 1956, 145 pages

Sum. I287

*YEREMENKO, V.N.* B-8  
 USSR/Physical Chemistry Thermodynamics, Thermochemistry,  
 Equilibria, Physical-Chemical Analysis, Phase Transitions.

Abs Jour : Referat Zhur - Khimiya, No 1, 1958, 402

Author : V.N. Yermenko, A.M. Beynish.

Inst :

Title :

Electrical Conductivity of Binary Systems of Refractory Oxides.

Orig Pub : Zh. neorgan. khimii, 1956, 1, No 9, 2118-2130

Abstract : The shrinkage at sintering and the electrical resistivity  $\zeta$  of binary systems  $Al_2O_3 - Cr_2O_3$ ,  $CaO - MgO$ ,  $CoO - TiO_2$ ,  $NiO - TiO_2$ ,  $ZrO_2 - TiO_2$ ,  $MgO - Cr_2O_3$  and  $CaO - Cr_2O_3$  at

20 to 9000 were measured. The  $\zeta$  of ceramic specimens was measured by the bridge method using direct current and alternating current of the sound frequency (500 cycles). The analysis of the curves  $\zeta$  - composition may

Card 1/2



USSR/Physical Chemistry - Thermodynamics, Thermochemistry,  
Equilibria, Physical-Chemical Analysis, Phase Transitions.  
Abs' Jour : Ref Zhur - Khimiya, No 1, 1958, 402

B-8

serve as a method of the physical-chemical analysis of  
systems. A conclusion concerning the existence of com-  
pounds  $\text{CoO} \cdot \text{TiO}_2$ ,  $\text{NiO} \cdot \text{TiO}_2$ ,  $\text{ZrO}_2 \cdot \text{TiO}_2$  and  $\text{MgO} \cdot \text{Cr}_2\text{O}_3$  was

made based on the study of the curves shrinkage - compo-  
sition and  $\xi$  - composition. The maximum of the curves  
 $\log \xi$  - composition of the system  $\text{CaO} - \text{Cr}_2\text{O}_3$  at 50 to

60 mol. % of the latter, was tentatively explained by  
the formation of the compound  $2\text{CaO} \cdot 3\text{Cr}_2\text{O}_3$ .

Card 2/2

YEREMENKO, V.N.  
USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria,  
Physical-Chemical Analysis, Phase Transitions. B-8

Abs Jour: Referat Zhurnal Khimiya, No 3, 1958, 7154.

Author : V.N. Yermenko.

Inst :

Title : Interaction of Titanium Carbide with Metals of Iron Group.

Orig Pub: Zh. neorgan. khimii, 1956, 1, No 9, 2131-2148.

Abstract: The systems TiC - M(Ni, Co, Fe) were studied by the thermal, metallographic, dilatometrical, durometrical (hardness measurement) and roentgenographic methods, and their state graphs in the range rich in metal were plotted; the systems are of the eutectic type with limited TiC solubility. In the system TiC - Ni, eutectic is at 1280° and 9.3% of TiC; the solubility of TiC in Ni is 6.2% at this temperature and 2% at 700°. The presence of free carbon was revealed in some alloys. In the system

-26-

Card : 1/2

USSR

Abs Jour: Referat Zhurnal Khimiya, No 3, 1958, 7154

APPROVED FOR RELEASE: 09/01/2001

CIA-RDP86-00513R001962710020-3

TiC - Co, eutectic is at 1360° and 6% of TiC. The solubility of TiC in Co drops from 1% at 1360° to 0.15% at 700°. TiC stabilizes the cubic modification of Co. In the system Ti - Fe, eutectic is at 1460° and 3.8% of TiC. The transition temperature of  $\alpha$ -Fe  $\rightarrow$   $\gamma$ -Fe rises to 920° due to the dissolution of TiC in Fe. The solubility of TiC in  $\gamma$ -Fe drops from 0.6% at the eutectic temperature to about 0.04% at 920°; in  $\alpha$ -Fe, it drops from 0.15% at 920° to 0.01% at 700°. In alloys of the ternary system Ti - C - Fe containing more C than it would correspond to the section Fe - TiC, an eutectoid transformation takes place at 695°.

-27-

Card : 2/2

"APPROVED FOR RELEASE: 09/01/2001

CIA-RDP86-00513R001962710020-3

APPROVED FOR RELEASE: 09/01/2001

CIA-RDP86-00513R001962710020-3

YEREMENKO, V.N.

Continuous drum-type stone catcher of the Bar Machine Building  
Plant. Sakh.prom. 30 no.7:30-31 J1 '56. (MLRA 9:11)

1. 2 Gorodokskiy sakharany zavod.  
(Sugar industry--Equipment and supplies)

YEREMENKO, V. N.

73-1-2/26

AUTHOR: Yermenko, V. N.

TITLE: The Thermodynamic Activity of Lead in Liquid Solutions of a Lead-Silver System. (Termodinamicheskaya Aktivnost' Svintsa v Zhidkikh Rastvorakh Sistemy Svinets-Serebro.)

PERIODICAL: Ukrainskiy Khimicheskiy Zhurnal, 1957, Vol.23, No.1, pp. 6 - 12 (USSR).

ABSTRACT: The activity, coefficients of activity and relative partial molar heat contents and entropies of lead were measured in liquid double solutions lead-silver. The electromotive forces and temperature coefficients E.D.S. were determined at a silver content up to 56 at .%, between the temperatures 450 - 760° for concentrated chains of the formula:

$Pb_{liq.}/PbCl_2$  (in KCl sol.) +  $LiCl/Pb$  (in Ag sol.)

The method used for measuring and calculating these values was described previously (viz. (1): Eremenko, V. N., Eremenko O. M., Bruevich, T. P.: Ukrain. Khim. Zh., 1951, Vol. 17, page 658). Lead containing 0.004% bismuth and 0.002% Cu was used for the experiment. The impurities of silver did not exceed 0.01 weight %. After extraction and homogenisation of the solutions the measurements were carried out at small temperature intervals (5 - 15° C.)

Card 1/2

73-1-2/26

The Thermodynamic Activity of Lead in Liquid Solutions of a  
Lead-Silver System.

Temperatures of the crystallization principles were determined by the E.D.S. method and results found to be in good agreement with those obtained by different methods. Considerable deviations from Raoult's Law occur in the system Pb-Ag. These deviations diminish with increasing temperatures in solutions containing more than 25 at.% Ag. At smaller Ag content the deviations are practically independent of the temperatures. It was shown that the difference of thermal capacity of lead in pure liquid states and in solutions with silver depends on the composition of the solution and is independent of the temperature. Liquid solutions of Pb-Ag show a tendency to separation. There are 4 tables and 4 graphs; 2 Slavic references.

SUBMITTED: September, 29, 1956.

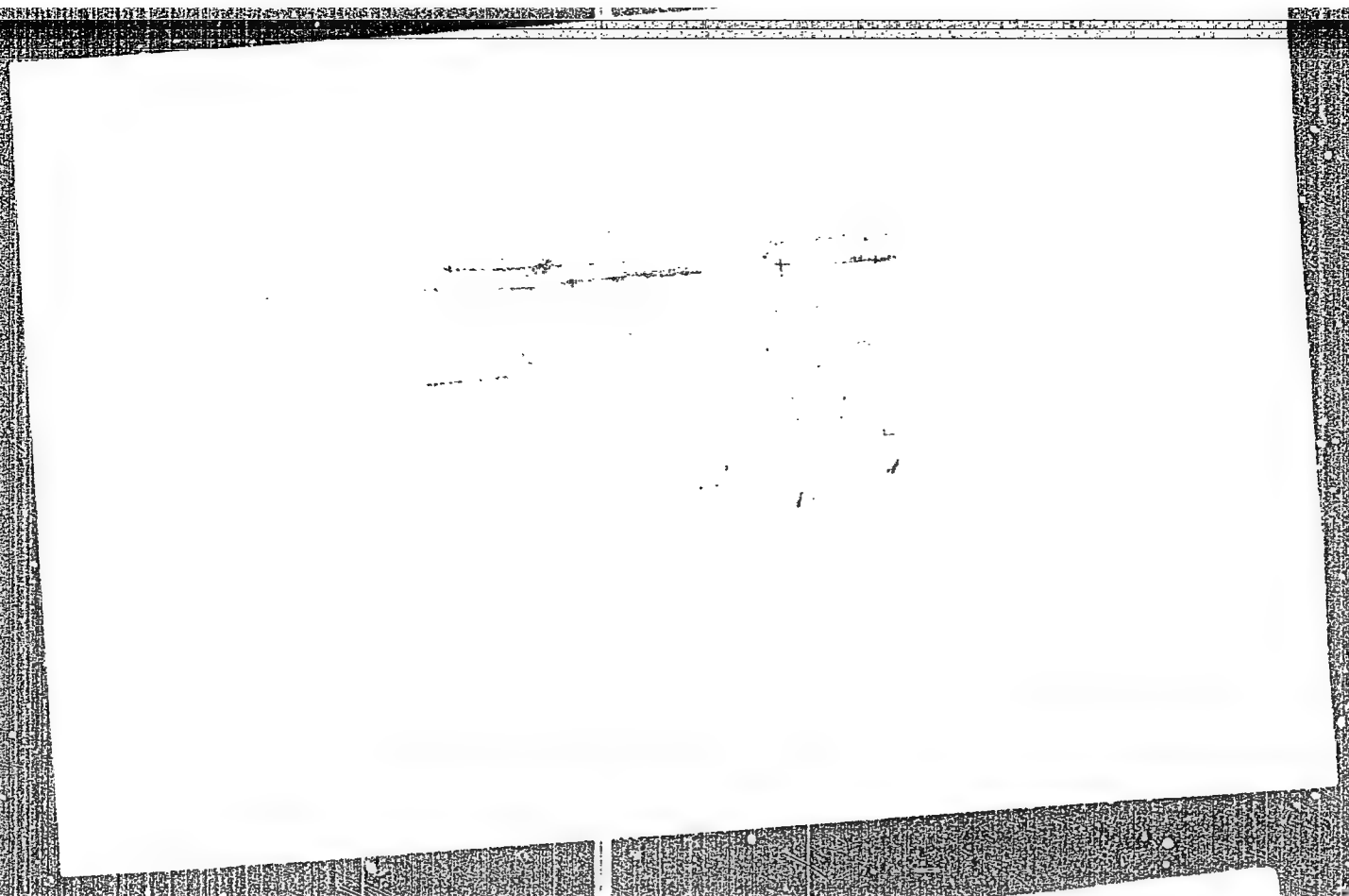
ASSOCIATION: Kiyev State University imeni T. G. Shevchenko.  
(Kiyevskiy Gosudarstvennyy Universitet im. T.G. Shevchenko)

AVAILABLE: Library of Congress

Card 2/2

**"APPROVED FOR RELEASE: 09/01/2001**

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**APPROVED FOR RELEASE: 09/01/2001**

**CIA-RDP86-00513R001962710020-3"**

YEREMENKO, V. N.

18(0)

PHASE I BOOK EXPLOITATION SOV/2341

Eremenko, Valentyn Nykyforovych, and Yuryy Vladymyrovych Naydych

Zmochuvannya ridkymy metalamy poverkhen' tuhoplavkykh spoluk  
(Wetting the Surface of High-Melting Alloys With Liquid Metals)  
Kiyev, Vyd-vo AN Ukrayins'koyi RSR, 1958. 59 p. 2,000 copies  
printed.

Sponsoring Agency: Akademiya nauk Ukrayins'koyi RSR. Instytut  
metalokeramiky i spetsial'nykh splaviv.

Ed.: I.M. Fedorchenko, Corresponding Member, Ukr. SSR Academy of  
Sciences; Ed. of Publishing House: I.F. Shtul'man; Tech.  
Ed.: N.P. Rakhlina.

PURPOSE: This book is intended for engineers and scientific person-  
nel working in the physical chemistry of molten metals; it may  
also be useful to senior students specializing in this field.

COVERAGE: The author discusses problems of wetting high-melting  
alloys with molten metal, a process used in the manufacture of  
heat-resistant and other materials. Results of experimental  
Card 1/3



SOV/2341

# Wetting the Surface (Cont.)

and theoretical investigations of the wetting process are presented and general thermodynamic principles are described. Published data on capillarity in molten metal are analyzed. No personalities are mentioned. There are 135 references: 63 Soviet, 65 English, and 7 German.

## TABLE OF CONTENTS:

Introduction	3
Ch. I. General Principles of Wetting	4
Effect of the $\sigma_{sl}$	5
Effect of the $\sigma_L$	6
Effect of the $\sigma_s$	8
Ch. II. Review of Data on Wetting of Nonmetallic Surfaces With Liquid Metals	12
Ch. III. Oxide-Metal System	20
Study of the relationship between the properties of oxides and wetting them with liquid metals	20

Card 2/3

SOV/2341

Wetting the Surface (Cont.)

Experimental study of the wetting of oxides  
Results of experiments  
Theoretical analysis of the processes of wetting oxides, and  
results of experiments

21

26

34

42

Ch. IV. Carbide-Metal System

46

Ch. V. Boride-Metal System

51

Appendix

57

Bibliography

AVAILABLE: Library of Congress

GO/ec

10-19-59

Card 3/3

YEREMENKO, U.N.

SOV/2170

18(0,7)  
PHASE I BOOK EXPLOITATION

Akademiya nauk Ukrainskoy SSR. Institut metallokeramiki i spetsial'nykh splavov

Voprosy poroshkovoy metallurgii i prochnosti materialov, vyp. 5  
(Problems in Powder Metallurgy and Strength of Materials, Nr 5)  
Kiyev, Izd-vo AN USSR, 1958. 172p. 2,000 copies printed.

Ed. of Publishing House: Ya. A. Samokhvalov; Tech. Ed.: V.Ye. Sklyarova; Editorial Board: I.N. Frantsevich (Resp. Ed.), I.M. Fedorchenko, G.S. Pisarenko, G.V. Samsonov, and V.V. Grigor'yeva.

PURPOSE: This collection of articles is intended for a wide circle of scientists and engineers in the research and production of powder metallurgy. It may also be useful to advanced students of metallurgical institutes.

COVERAGE: This collection of articles describes the results of investigations made at the Institut metallo keramiki i spetsial'nykh splavov, AN USSR (Institute of Powder Metallurgy and Special Alloys, Academy of Sciences, Ukrainian SSR). The physical and chem-

Card 1/6

SOV/2170

# Problems in Powder Metallurgy (Cont.)

ical properties of materials used in powder metallurgy are discussed. Materials described as new, production processes, and methods and results of mechanical testing are described. No personalities are mentioned. References follow each article.

## TABLE OF CONTENTS:

Samsonov, G.V., and V.S.Neshpor. Some Physical Characteristics of Metal-like Compounds. 3  
The authors describe results of investigations of microhardness, coefficient of thermal expansion, calculation of the inter-atomic bond between the metal and the metalloid, and factors affecting this bond. They conclude that the hardness of the metal-like compounds is determined chiefly by the bonding forces between the atoms of the metal and the metalloid.

~~Yeremenko, V.N., G.V. Zudilova, and L.A. Gayevskaya, Chromium-Niobium Structural Diagram~~ 36  
The authors describe the results of an investigation of the chromium-niobium system by thermal, metallographic, and radiographic methods.

Card 2/6

129-1-2/17

YEREMENKO, V. N.

AUTHORS: Yeremenko, V.N., Zudilova, G.V. and Gayevskaya, L.A.  
 TITLE: On the Diagrams of State of the System Chromium-Niobium  
 (O diagramme sostoyaniya sistemy khrom-niobiy)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, No.1  
 pp. 11 - 16 (U3SR).

ABSTRACT: Use of niobium as an addition to chromium alloys has created an interest in the system chromium-niobium. However, very little data are published in literature on this system. Therefore, the authors investigated the manufacture by smelting and sintering of chromium alloys with niobium for the purpose of constructing the elements of the diagram of state of this system. The molten alloys were produced in a high-frequency furnace under a protective argon atmosphere from powders of electrolytic Cr-Nb of the sizes of 1 - 5  $\mu$ . The chromium was crushed in a steel ball mill and the iron removed by washing with nitric acid and then passed through a sieve with 10 000 holes/cm<sup>2</sup>. The niobium powder contained 98.2% Nb, 0.93% Fe, 0.34% Ti, 0.06% Al, 0.56% Ca, 0.007% S and less than 0.01% P. The powders were mixed and pressed into briquettes, applying a pressure of 7.5 tons. A sketch of the melting device and 1/3 is given in Fig.1, p.11. The results of the thermal analysis

On the Diagram of State of the System Chromium-Niobium.  
 are entered in Table 1, p.12. The compositions of the obtained sinter alloys are entered in Table 2, p.12; Table 3, p.15, gives the results of the decoding of the X-ray picture of the inter-metallic compound (containing 47.3% Nb); Table 4 gives the results of measuring the parameters of the lattice of a chromium-base solid solution. In Figs. 2 - 8, a few of the obtained micro-photographs are reproduced. The data given in Table 3 indicate that almost all the lines of the X-ray pictures are in agreement with the assumptions made by the authors. The diagram of state of the system Cr-Nb proposed by the author, is plotted in Fig.9, p.16. The following conclusions are arrived at: on the basis of the results of thermal, metallographic and X-ray structural analysis and measurement of the micro-hardness, it was found that in the system Cr-Nb, only one inter-metallic compound NbCr<sub>2</sub> forms, which has a face-centred cubic lattice; inter-metallic compounds form eutectics with chromium- and niobium-base solid solutions and the temperature of liquidus crystallisation of the inter-metallide with chromium-base solid solution is 1 660 °C (for a content of 17.10% Nb). The eutectic point is at 1 710 °C and chromium-base

129-1-3/14

On the Diagram of State of the System Chromium-Niobium.

solid solutions form; the solubility of niobium in chromium at 1 350 °C is about 3 wt.%. Long duration annealing at 1 350 °C coarsens the components of the eutectic and after annealing for 100 hours at 1 350 °C, the structure does not have a eutectoidal character. Alloys of chromium with niobium can be obtained by sintering inside a protective atmosphere at 1 550 °C; in the case of sintering for 2 to 5 hours at 1 550 °C, a full recrystallisation takes place and an equilibrium state is reached. There are 9 figures and 4 tables and 3 non-Slavic references.

ASSOCIATION: Institute of Metallo-ceramics and Special Alloys  
Ac.Sc. Ukrainian SSR.  
(Institut Metallokeramiki i Spetsial'nykh Splavov  
AN USSR)

AVAILABLE: Library of Congress.  
Card 3/3

65552

SOV/81-59-21-75503

18.6100

Translation from: Referativnyi zhurnal, Khimiya, 1959, Nr 21, p 317 (USSR)

AUTHOR: Yeremenko, V.N.

TITLE: Metal-Ceramic Heat-Resistant Materials Based on Titanium Carbide

PERIODICAL: Byul. In-t metallokeram. 1 spets. splavov AS UkrSSR, 1958, Nr 3, pp 27 - 53

ABSTRACT: The problem of interaction of the components, the role of the surface phenomena, the selection of the cementing TiC alloy, and the properties of the finished material are considered in this article. The results of the investigation of the TiC-Co, TiC-Ni, and TiC-Fe systems have shown that all these systems are of the eutectic type with the coordinates of the eutectic point: 6, 9 and 3.8% TiC, respectively, and the temperature of the appearance of the liquid phase 1,360, 1,280 and 1,460°C. With the aim of improving the properties of the materials based on TiC cemented by pure Co or Ni it is proposed to introduce alloyed additions. In order to increase the resistance of the carbide phase against oxidation at high temperatures the partial replacement of TiC by pure TaC or by the ternary solid solution TiC + TaC + NbC is recommended as well as the

Card 1/2

65852

SOV/81-59-21-75503

# Metal-Ceramic Heat-Resistant Materials Based on Titanium Carbide

alloying of TiC with chromium. In order to improve the properties of the metal alloy (Co or Ni) it is alloyed with Cr employing chromium-nickel, chromium-cobalt or ternary nickel-cobalt-chromium alloys. Cr increases simultaneously the resistance against oxidation, the heat- and creep-resistance of the alloy. Compositions and properties of materials based on TiC and produced by various firms are presented. The comparison of the properties of the materials shows that the density, the bending resistance limit and the toughness increase with the alloy content, but the tensile strength and the hardness decrease. The high thermal resistance of the alloys based on TiC in comparison with the thermal resistance of other ceramic metals and pure ceramic materials is explained by the low coefficient of thermal expansion and the high heat conductivity (0.075 - 0.085 cal/cm sec degree).

G. Gerashchenko

Card 2/2



YEREMENKO, V.H.; MATANZON, Ya.V.

Role of the transportation of matter through the gaseous phase  
in the sintering of iron and chromium. Vop.por.met. i prochn.  
mat. no.5:73-79 '58. (MIRA 12:8)  
(Powder metallurgy)

NAYDICH, Yu.V.; YEREMENKO, V.N.

Wetting hard surfaces of certain high-melting point compounds  
with liquid metals. Vop.por.met.1 prochn.mat. no.6:53-64  
'58. (MIRA 13:4)

(Powder metallurgy)

SOV/24-58-7-31/36

AUTHORS: Yeremenko, V.N., Ivashchenko, Yu.N., Nizhenko, V.I.  
and Fesenko, V.V. (Kiyev)

TITLE: Determination of the Surface Tension of Metals of the  
Iron Family (Opredeleniye poverkhnostnogo natyazheniya  
metallov semeystva zheleza)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh  
nauk, 1958, Nr 7, pp 144 - 146 (USSR)

ABSTRACT: The authors point out that wide discrepancies exist in  
the published data on the surface tension of iron  
(Refs 1, 2) and nickel (Refs 3-5) and that only one  
investigation has been made on that of cobalt (Ref 5).  
They describe an investigation in which the surface  
tension of these metals (less than 0.01% impurity) was  
measured by two methods. In experiments by the recumbent  
drop method the drop was supported on pure alumina,  
beryllia or magnesia in a water-cooled quartz tube with  
suitable screening. Heating was by induction with a  
graphite element, temperature measurement by a previously  
calibrated optical pyrometer to an accuracy of 20 °C.  
The apparatus, shown in Figure 1, was provided with an

Card 1/3

SOV/24-58-7-31/36

Determination of the Surface Tension of Metals of the Iron Family  
 optical system for photographing the shadow of the drop. Tests were carried out in vacuo and also in purified helium and hydrogen. The surface tension was calculated with the use of published tables (Ref 6). The reliability of the method was checked by determining the surface tension of aluminium and good agreement with published data was obtained. A second series of determinations was made with the bubble-pressure method (Figure 2). A beryllium capillary was used, allowance being made for wall thickness. Metal temperatures were measured to  $\pm 10^{\circ}\text{C}$  with a type TsNIChM-1 tungsten-molybdenum thermocouple. Purified helium and hydrogen were used to form the bubble. The results obtained by the two methods at  $1470 - 1650^{\circ}\text{C}$  are tabulated, showing that the accuracy of both is about  $\pm 5\%$ . There are 2 figures, 1 table and 12 references, 3 of which are Soviet, 6 English and 3 German.

Card 2/3

SOV/24-58-7-31/36

Determination of the Surface Tension of Metals of the Iron Family

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov  
AN USSR (Cermets and Special Alloys Institute,  
Ac.Sc., Ukrainian SSR)

SUBMITTED: October 17, 1957

Card 3/3

78-3 3-47/47

AUTHOR: Yeremenko, V. N.

TITLE: ~~Discussion of Lectures~~  
(Obsuzhdeniye dokladov)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958. Vol. 3, Nr 3,  
pp. 837-839 (USSR)

ABSTRACT:

The question of the speaker regarding the comparison of the results of the investigation of phase diagrams and of the structure of the chromium-titanium alloys was answered by G. I. Nosova. She explained the temperature difference in eutectoid conversion by the use of various methods in the determination of the conversion temperature. The speaker thinks that this can not be right as the conversion temperature was determined by the same method. The results, however, were different. He is rather inclined to explain the higher temperatures of eutectoid conversion by the fact that the alloys were produced by means of the method used in powder metallurgy, namely by sintering. At present there are numerous data on the temperature of the eutectoid transition in chromium-titanium alloys. In the case of cast and deformed

Card 1/3

78-3 3-47/47

## Discussion of Lectures

alloys this temperature is below  $700^{\circ}\text{C}$ . When, however, the alloys were produced by the method of powder metallurgy and when they had not been deformed they have a remarkable porosity and a formed inner surface in their final state. In such alloys, not only in chromium-titanium, a retardation of phase transitions is observed. In constructing a phase diagram these differences are of no principal importance. Systematic temperature deviations, however, occur in the phase transitions. Also the purity of the metal plays a rôle. A difference can also be formed in the presence of nitrogen (the alloys investigated by the speaker contained 0.1% nitrogen). The speaker finds the explanations by M. A. Tylkina very interesting who spoke on the structure of alloys on a rhenium basis. One can hardly assume that rhenium can be used as basis or even as an alloying element for alloys of constructional character. There are, however, fields where the use of rhenium alloys are absolutely hopeful and where they are already being used. These are first of all contact materials for current and voltage under especially unfavorable

Card 2/3

Discussion of Lectures

78-3 3-47/47

conditions as well as the field of electronics. I. N. Frantsevich and the aspirant V. N. Bulanov commonly investigated the structure of the rhenium-beryllium alloy at the Institute for Metal Ceramics and Special Alloys of the AS Ukrainian SSR.- Finally the speaker said that the work on the phase diagrams of metal systems is not coordinated centrally. He joins M. V. Chukhrov in his opinion that a centrally organized information- and publication service should be arranged in this field.  
There are 3 figures

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR (Institute for Powder Metallurgy and Special Alloys, AS Ukrainian SSR)

Card 3/3



AUTHOR:

Krimer, B. I., Yeremenko, V. N.

78-3-4-10/38

TITLE:

Review of the Lectures ( Obsuzhdeniye dokladov)

PERIODICAL:

Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 4,  
pp. 895-897 (USSR)

ABSTRACT:

Krimer states that the results concerning the phase equilibrium in the tungsten-niobium system, which were delivered by V. S. Mikheyev did not completely agree with those obtained by Krimer in the Laboratory for Metallography of the Institute for Steel (Moscow). Here Krimer gives his results which are represented in one table and 7 diagrams. The author worked with almost pure tungsten (99.99%); pure niobium was not at his disposal; furthermore, with 99.4% niobium containing 6% of secondary components of which . . . titanium, 0.1 % silicon, 0.07 % iron and 0.04 % lead. Besides, the author acknowledges that the meltings were performed in a vacuum-electrode-furnace, which possessed a copper base and that by this the alloys were polluted to a small extent. The first two diagrams here refer to the

Card 1/3

78-3-4-10/38

Review of the Lectures

measurements of the lattice periods of the solid solution at 1200° and 1400°; the following two of the hardness measurements according to Vickers: a) after homogenization and b)- after hardening at 1200°; the next diagram shows measurements of the specific electric resistance conditions, and finally a diagram shows temperature measurements of the melt dependent on its composition. Krimer arrives at the assumption that it is "more probable" that the formation of a continuous series of solid solutions must be the consequence of the combined action of niobium and tungsten. Yermenko, of the Institute for Metal- Ceramics and Special Alloys of the Ukrainian AS, compares the results of his investigations of 1956 concerning the alloy structure of the chromium-niobium systems with the results of V. F. Franke which were last delivered on the same subject, and finds them in agreement except the temperatures; especially the solidus temperature - in the author's measurements-resulted 60° higher; because, however, here a question of accuracy of  $\pm 30^\circ$  is in question, the author is of opinion that the

Card 2/3

Review of the Lectures

78-3-4-10/38

determined difference is not of great importance, the author states that the temperatures given in the lectures by Funke and Yelyutin generally were too low. Concerning the solubility of chromium in niobium (maximum concentration) Yeremenko is of opinion that on this subject too high values were published, for 20% certainly were too high. The author maintains that he had performed radiographic investigations of the  $\text{Cr}_2\text{Nb}$  compound as well; however, two compound modifications, which are dealt with by Funke and Yelyutin could not be determined by him. There are 7 figures, 1 table.

ASSOCIATION: Institut stali, Moskva (Moscow, Steel Institute)  
Institut metallokeramiki i spetsial'nykh splavov AN USSR  
(Institute for Metallo ceramics and Special Alloys, AS  
Ukrainian SSR)

Card 3/3

YEREMENKO, V.N.

21(8) PULSE I BOOK EXPLOITATION 30V/2117  
Sovetskoye po eksperimental'noy tekhnike i metodam vysokotemperaturnykh issledovaniy, 1956

Experimental'naya tekhnika i metody issledovaniy pri vysokikh temperaturakh; study sovetskoykh eksperimental'nykh tekhnika i metody issledovaniy pri vysokikh temperaturakh; Transactions of the Conference on Experimental Techniques and Methods of Investigation at High Temperatures; Moscow, AN SSSR, 1959. 789 p. (Series: Akademiya nauk SSSR. Institut metallurgii. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali) 2,200 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: A.L. Bakhviter.

PURPOSE: This book is intended for metallurgists and metallurgical engineers.

CONTENTS: This collection of scientific papers is divided into six parts: 1) thermodynamic activity and kinetics of high-temperature processes; 2) constitution diagram studies; 3) physical properties of liquid metal alloys; 4) new analytical methods and production of pure metals; 5) properties of alloys; 6) general questions. For more specific coverage, see Table of Contents.

Experimental Techniques and Methods (Cont.) 30V/2117  
Yeremenko, V.N., G.V. Zudilova, and L.A. Gayevskaya. Constitution Diagrams of the System Chromium-Niobium 224

Magreanu, T. Quantitative Relationships Existing Between Components Under Conditions of Equilibrium of Slags in the Blast-Furnace Hearth 237

### III. PHYSICAL PROPERTIES OF LIQUID METALS AND SLAGS

Pope, S.P., and O.A. Fein. Methods of Measuring the Surface Tension of Liquid Metals and Slags 257

The maximum surface tension results obtained in measuring the surface tension of slags of the system  $\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$  and  $\text{CaO-SiO}_2\text{-MgO}$  by the maximum-bubble-pressure method and the sessile-drop method. It was shown that the replacement of  $\text{SiO}_2$  by  $\text{CaO}$  (with constant  $\text{Al}_2\text{O}_3$  content) in the system  $\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$  leads to an increase in surface tension. An increase in the content of  $\text{Al}_2\text{O}_3$  (with a constant ratio of  $\text{CaO}$  to  $\text{SiO}_2$ ) also results in higher surface tension. This is explained by a breaking-down of silicate anions. It was shown that the replacement of  $\text{CaO}$  by  $\text{MgO}$  in the system  $\text{CaO-SiO}_2\text{-MgO}$  has practically no effect on surface tension.

Yeremenko, V.N., Yu.M. Ivashchenko, and V.I. Kizhenko. Measurement of Surface Tension of Metals and Alloys by the Sessile-Drop Method 265

The surface tension of tin at temperatures of 251-882° C was determined by the sessile-drop method and the maximum-bubble-pressure method. The former method was shown to be accurate to within ±1.5 percent and capable of further refinement with improved equipment and methods of calculation.

YEREMENKO. V. N.

PHASE I BOOK EXPLOITATION NOV/3624

Anders, Paul D. R. Institut metallurgiki i spetsial'nykh splavov

Metallurgicheskoye materialy i metody im isledovaniya: informatsionnyye materialy (Current Materials and Methods of Their Analysis: Information Material) Kiev, Izd-vo AN UkrSSR, 1959. 25 p. 1,500 copies printed.

Ed. of Publishing House: I.V. Kistina; Tech. Ed.: A.M. Lisovets; Editorial Board: I.M. Prantsevich, I.M. Podchukov, G.S. Piskunov, G.V. Samonov (Resp. Ed.), V.N. Yermolenko, and V.N. Fedurov.

PURPOSE: This collection of articles is intended for scientific workers, designers, and engineering and technical workers in the metallurgical, machinery-manufacturing and other branches of industry.

CONTENTS: In this collection of articles the authors describe the production of carbides, nitrides and other heat resisting compounds, giving their physicochemical and mechanical properties. Their thermal processing and the processing installations are also described. A new method is proposed for the production of rods from refractory compounds. Certain compounds are analysed, and the energy dissipation in materials during high-frequency mechanical vibrations is determined. No personalities are mentioned. There are 1 schematic drawings, 7 diagrams, 6 tables and 11 references, 16 of which are Soviet.

Podchukov, I.M., and G.S. Prantsevich. Installation for Determining the Kinetics of Evaporation and the Vapor Tension of Metal Materials

of Energy Dissipation in Materials During Vibrations 17

Yermolenko, V.N., and V.N. Yermolenko. Installation for Heat Treatment of Specimens at High Temperature 22

Yermolenko, V.N., and T.N. Vailanova. Conditions for Preparing Alloys of Titanium Carbide With Molybdenum 25

Kilbas, A.Kh. Determination of Small Quantities of Nitrogen in Titanium Carbide 27

Ostrikova, A.P. Device for Measuring the Thermoelectromotive Force of Semiconductor Materials at Room Temperature 30

Kolov, L.A. Utilization of Lacquer Coatings to Investigate the Limiting State of Metals 32

Samonov, G.V. Physicochemical and Mechanical Properties of the Carbides and Nitrides of Boron and Silicon 36

Yermolenko, V.N. Calorimetric Method of Determining Energy Dissipation in a Material During High-Frequency Mechanical Vibrations 40

Verkhovlyadova, T.S. Preparation of Titanium Nitride From Titanium Sponges 45

Lugay, L.N., and G.O. Seraya. Analysis of Vanadium Silicide 46

Verkhovlyadova, T.S., and G.V. Samonov. New Method of Preparing Bars From High-Melting Compounds 50

Samonov, G.V., T.S. Verkhovlyadova, M.M. Antonov, and T.V. Dubovik. Preparation of the Nitrides of High-Melting Metals 53

YEREMENKO, V. N.

"The Physico-Chemical Foundations of the Formation of a Metallo-Ceramic body."

report presented at the Section on Colloid Chemistry, VIII Mendeleev Conference of General and Applied Chemistry, Moscow, 16-23 March 1959.  
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

SOV/180-59-2-20/34

AUTHORS: Yeremenko, V.N., and Naydich, Yu.V. (Kiyev)

TITLE: Measurement of the Surface Tension and Density of Liquid Chromium (Izmereniye poverkhnostnogo natyazheniya i plotnosti zhidkogo khroma)

PERIODICAL: Izvestiya akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 2, pp 111-112 (USSR)

ABSTRACT: The authors have used a modification of the apparatus they have previously described (Ref 1) to measure the surface tension and density of liquid chromium by the quiescent drop method. The main parts of the apparatus are a vacuum chamber and arrangements for photographing (at a magnification of  $\times 5-7$ ), the drop. The drop dimensions were determined with a measuring microscope and the surface tension and volume of the drops were determined from published tables (Ref 2). After preliminary experiments with helium a purified hydrogen atmosphere was adopted. The results obtained under various conditions at 1950 °C are tabulated. The mean value of the density was found to be  $6 \pm 0.13 \text{ g/cm}^3$ ,

Card 1/2

SOV/180-59-2-20/34  
Measurements of the Surface Tension and Density of Liquid Chromium  
and the mean value of the surface tension  
 $1590 \pm 50 \text{ erg/cm}^2$ .  
There are 1 table and 2 references, 1 of which is Soviet  
and 1 English.

SUBMITTED: November 1, 1958

Card 2/2



30665

8/137/61/000/010/018/056  
A006/A101

15.2530

AUTHORS: Yeremenko, V.N., Naydich, Yu.V.

TITLE: Investigating the wetting of solid surfaces of some high-melting compounds with liquid metals

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 35, abstract 100282 ("Byul. In-t metallokeram. i spets. splavov AN UkrSSR", 1959, no. 4, 38 - 51)

TEXT: The authors studied the wetting of solid oxides and borides with liquid metal. They revealed the connection between the wetting of solid oxides and their physical-chemical properties. Oxides with a high concentration of free electrons, i.e. with a higher electric conductivity are better wetted by liquid metals under equal other conditions. In turn, electric conductivity increases with a decreasing heat of oxide formation. The wettability of borides with molten Cu increases with the growth of the ordinal number of the periodic system of the corresponding transition metal, forming a boride, i.e. with decreasing metal-B bonds. An analysis of literature data leads to the conclusion that when

Card 1/2

30665

S/137/61/000/010/018/056  
A006/A101

Investigating the wetting of solid surfaces ...

wetting metal carbides the s-d-interaction plays the decisive part, and that only transition metals are able to well wet the carbides. There are 19 references:

V. Shulepov

[Abstracter's note: Complete translation]

Card 2/2

32594 S/137/61/000/011/004/123  
A060/A101

18.8100

1418 1454

AUTHORS: Fesenko, V. V., Yeremenko, V. N.

TITLE: Method of maximal pressure in a gas bubble as applied to the determination of surface tension of metals of the iron family

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 11, 1961, 5, abstract 11A37 ("Byul. In-t metallokeram. i spets. splavov AN USSR", 1959, no. 4, 52-64)

TEXT: An analysis is carried out in order to determine the possibility of applying the method of maximal pressure in a gas bubble to investigate the surface tension  $\sigma$  of melts which do not wet the material of the capillary. A method of calculation is proposed which allows one to determine the  $\sigma$  of non-wetting liquids on the basis of experimental data obtained from measurements taken with thick-walled capillaries. A description is given of an apparatus for the measurement of  $\sigma$  and the results are cited of the determination of the  $\sigma$  of Ni ( $1,520 \pm 60$  dynes/cm), Co ( $1,600$  dynes/cm) and Fe ( $1,415 \pm 90$  dynes/cm) at  $1,500 - 1,600^\circ\text{C}$ .

V. Lazarev

[Abstracter's note: Complete translation]

Card 1/1

S/081/61/000/024/014/066  
B138/B102

AUTHORS: Yeremenko, V. N., Nizhenko, V. I., Ivashenko, Yu. N.

TITLE: Stationary drop method of measuring the surface tension of metals of the iron group

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 24, 1961, 94, abstract 24B690 (Byul. In-t metallokeram. i spets. splavov, AN USSR, no. 4, 1959, 65 - 71)

TEXT: An apparatus has been designed for the measurement of surface tension  $\sigma$  of molten metals, both in a vacuum and in protective atmospheres, using the stationary drop method and h-f heating up to 1750°C.  $\sigma$  was determined for aluminum in a vacuum and in a helium atmosphere. The results are in agreement with published data. Within the limitations of experimental error, estimated at  $\pm 5\%$ , the h-f field did not influence the  $\sigma$  value of molten metals under the conditions used in this case.  $\sigma$  was measured for metals of the iron group. [Abstracter's note: Complete translation.] ✓

Card 1/1

S/137/62/000/006/079/163  
A052/A101

AUTHORS: Yeremenko, V. N., Kosolapova, T. Ya.

TITLE: Once more on the titanium carbide-nickel interaction

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 35, abstract 6G268  
(In collection: "Vopr. poroshk. metallurgii i prochnosti materialov".  
Kiyev, AN UkrSSR, no. 7, 1959, 3 - 6)

TEXT: Alloys of TiC (0.1 - 80%) with Ni produced by powder metallurgy methods were subjected to isothermal ageing at 1,040°C (in argon), 1,250, 1,300, 1,350 and 1,400°C (in vacuum) during 1 - 100 hours (depending on the temperature) and to oil hardening. To define more accurately the constitution diagram of TiC-Ni and to study the character of the TiC-Ni interaction the alloys were investigated metallographically and by the chemical phase analysis. It is shown that at the TiC-Ni interaction under indicated conditions no precipitation of free C takes place, and the system TiC-Ni is a quasibinary one, contrary to the opinion of R. Steinitz. ✓

A. Epik

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/006/071/163  
A052/A101

AUTHORS: Yeremenko, V. N., Natanzon, Ya. V.

TITLE: Kinetics and oxidation mechanism of titanium carbide with chromium additions

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 32, abstract 6G246  
(In collection: "Vopr. poroshk. metallurgii i prochnosti materialov".  
Kiyev, AN UkrSSR, no. 7, 1959, 7 - 17)

TEXT: Oxidation (500 - 1,200°C) of porous and hot-pressed TiC and also of porous TiC alloyed with Cr additions (up to 7.8%) has been studied. It is shown that the kinetics of oxidation is characterized by two stages; in the 1st stage the rate is determined exclusively by the rate at which the surface layers of the sample are enriched with oxygen. The 2nd stage is determined by the speed of the growth of the film. Each stage is characterized by its own value of activation energy. In the high-temperature region a Cr addition increases the resistance to the scale formation, in the low-temperature region (500 - 700°C) it decreases this resistance. The mechanism of oxidation is discussed. There are 9 references.  
[Abstracter's note: Complete translation] R. Andriyevskiy ✓

Card 1/1

5(2), 15(2)  
AUTHORS:

Yeremenko, V. M., Naydich, Yu. V.

SOV/78-4-9-20/44

TITLE:

The Wetting Capacity of the Borides and Carbides by Liquid Metals

PERIODICAL:

Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 9, pp 2052-2057  
(USSR)

ABSTRACT:

For producing cermets borides and carbides of transition metals are used as solid phase, which is wetted by liquid metal. Thus, the wetting capacity of the solid phase is of technical significance. A study was made of the diborides  $TiB_2$ ,  $VB_2$ ,  $ZrB_2$ ,  $NbB_2$ ,  $TaB_2$ ,  $CrB_2$ , and  $MoB_2$ , pressed at  $2100-2500^\circ$ , which had been placed at the authors' disposal by G. V. Samsonov. For this the authors express their gratitude. The wetting capacity was determined by measuring the temperature dependence of the wetting angle formed by a metal drop at rest on the boride or carbide in a rare gas atmosphere. For copper the results are given in tables 1, 2, and in figure 1. There exists a certain temperature for every boride, at which the wetting angle begins to diminish rapidly. Results obtained for nickel are outlined. The wetting capacity was found to be lower than that of copper. For elements

Card 1/2

The Wetting Capacity of the Borides and Carbides by      SOV/78-4-9-20/44  
Liquid Metals

of the same group, the wetting capacity of their borides grows with increasing atomic number. Data given in publications on the system carbide - metal are mentioned in table 3. Two groups of metals are distinguishable. The one reacts weakly with the carbide surface, and the other deliquesces on the carbide. All carbide-dissolving metals (Ni, Co, Fe) belong to the latter group. These are the transition metals having incomplete d-electron shells. There are 1 figure, 3 tables, and 12 references, 6 of which are Soviet.

SUBMITTED:    May 26, 1958

Card 2/2



05872  
SOV/78-4-11-25/50

5(2)  
AUTHORS: Yeremenko, V. N., Listovnichiy, V. Ye.

TITLE: Specific Electric Resistance in Binary Oxide Systems

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 11,  
pp 2544 - 2550 (USSR)

ABSTRACT: The classical investigations of N. S. Kurnakov and V. A. Zhemchuzhnyy have revealed a definite relationship between the phase diagram of metallic systems with the electrical conductivity - composition diagram. It could be assumed that such a relationship existed also in oxide systems. In order to confirm this hypothesis, the authors investigated the systems MgO - NiO, MgO - TiO<sub>2</sub> and CuO - Fe<sub>2</sub>O<sub>3</sub>. The specific electrical conductivity  $\rho$  was measured with the help of a measuring bridge of an apparatus demonstrated in figure 1. Temperature: up to 1000°. Samples were prepared from powdered oxides by bending with a synthetic rubber solution in benzene and by sintering in a VNII-120 kryptol furnace. Figures 2 to 4 show the measured dependence of  $\log \rho$  on the composition of the systems under discussion; figure 5 illustrates the dependence of the thermoelectric force on the concentration of Fe<sub>2</sub>O<sub>3</sub> in the system

Card 1/2

05872

SOV/78-4-11-25/50

Specific Electric Resistance in Binary Oxide Systems

$\text{CuO} - \text{Fe}_2\text{O}_3$ . The thermoelectric force has three maxima (at 20, 48 and 67 mole% of  $\text{Fe}_2\text{O}_3$ ) which need further investigation. Results of measurement obtained by western scientists for the systems  $\text{MgO} - \text{TiO}_2$ ,  $\text{CaO} - \text{ZrO}_2$ ,  $\text{La}_2\text{O}_3 - \text{ZrO}_2$ ,  $\text{TiO}_2 - \text{ZrO}_2$ ,  $\text{Al}_2\text{O}_3 - \text{SiO}_2$ ,  $\text{SiO}_2 - \text{TiO}_2$ ,  $\text{Al}_2\text{O}_3 - \text{Ce}_2\text{O}_3$  and the system  $\text{CoO} - \text{TiO}_2$ , which was investigated by the first-mentioned author together with A. M. Beynish (Ref 1) as well as a publication by P. Avgustinik and Ya. Antselevich on  $\text{MgO} - \text{ZrO}_2$  (Ref 14) are discussed and partly represented in graphs. On account of this survey it is indicated here that measurement of the electric resistance of oxide systems at high temperatures is suited only to investigate the formation of chemical compounds but is not sufficiently sensitive method of phase-limit determination. There are 12 figures and 14 references, 3 of which are Soviet.

ASSOCIATION: Institut metallokeramiki iz spetsial'nykh splavov Akademii nauk USSR (Institute for Cermets From Special Alloys of the Academy of Sciences of the UkrSSR)

SUBMITTED: July 11, 1958

Card 2/2

5 (4)

AUTHORS:

Yeremenko, V. N., Naydich, Yu. V.

SOV/76-33-6-11/44

TITLE:

Investigation of the Wetting of Solid Surfaces of Difficultly Melting Oxides With Liquid Metals (Issledovaniya smachivaniya zhidkimi metallami tverdykh poverkhnostey tugoplavkikh okislov)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol. 33, Nr 6, pp 1238-1245 (USSR)

ABSTRACT:

Molten metal is used as a binding agent for the high-melting oxides and carbides in the production of cermets. Therefore, the wettability (W) of cermets by molten metal is of particular importance. It may be assumed that the (W) of the semiconductor is the greater, the higher its electrical conductivity is. In the work under review this relationship was investigated in the systems: Mg - NiO, MgO - CoO,  $Al_2O_3$  -  $Cr_2O_3$ ,  $MgO \cdot Cr_2O_3$  -  $Fe_3O_4$ . Tin, aluminum (99.99 % Al), copper (99.99 % Cu), nickel (99.99 % Ni) and Armco iron were used as binding agents. Experiments were made with a specially designed apparatus (Fig 1) in vacuum and argon atmosphere at temperatures of up to 1550°. All systems investigated reveal that the (W) increases in parallel with the electrical

Card 1/3

Investigation of the Wetting of Solid Surfaces of  
Difficultly Melting Oxides With Liquid Metals

SCV/76-33-6-11/44

conductivity. The wetting angle measured changes markedly e.g. in the system (Mg, Ni)O - Sn from  $130^{\circ}$  to  $10-20^{\circ}$ . Considerations are made concerning the chemical reaction at the phase boundary, and a computation of the surface energy between the phases is carried out. It is assumed that the electrons of conductivity participate in the molten metal wetting phenomena concerning the oxides. A relationship was found between the electrical conductivity of the oxides and their thermodynamic stability (of the formation heat). The computed results concerning the wetting angle of liquid metal on the oxide surface are compared with experimental data and they are shown to agree with respect to the order of magnitude. The computation, however, must be worked out with a still greater accuracy. There are 3 figures and 14 references, 6 of which are Soviet.

ASSOCIATION: Akademiya nauk USSR, Institut metallokeramiki i spetsial'nykh splavov (Academy of Sciences of the UkrSSR, Institute of Powder Metallurgy and Special Alloys)

Card 2/3

Investigation of the Wetting of Solid Surfaces of  
Difficultly Melting Oxides With Liquid Metals

SOV/76-33-6-11/44

SUBMITTED: October 16, 1957

Card 3/3

VEREMENKO, V. N.

ANALYSIS MADE 5535

PHASE I BOOK EXCERPTION SV/3186

ANALYSIS MADE 5535  
Spectroscopic and Spectroscopy (Structure of Matter  
and Spectroscopy) Moscow, Izd-vo AN SSSR, 1960. 113 p.  
Kreft slip inserted. 2,300 copies printed.

Ed.: E. V. Alabov, Professor; Tech. Ed.: T. P. Polonova.

PREFACE: This collection of articles is intended for physicists  
and chemists interested in spectroscopic methods of research  
on the structure of molecules and related problems.

CONTENTS: The articles contained in this collection were  
taken from the editorial files of the Zhurnal Fizicheskoy  
Khimii (Journal of Physical Chemistry) and are concerned  
with spectroscopic methods in research on the structure of  
molecules, the hydrogen bond, isotopic effects, problems  
of magnetohydrodynamics, the structure of aqueous solutions of  
electrolytes, and the chemistry of complex compounds. Refer-  
ences accompany individual articles.

The authors thank the following for having participated  
in preparing the density of deuterio compounds: V. O.  
Gerasimov, V. K. Kuznetsov, V. I. Kuznetsov, Ye. Z. Zhur-  
avlev, V. I. Kuznetsov, and L. S. Zhilina. So. Chernov A. I.  
Thanks for his discussion of the results.

Author: A. M. and N. B. Alabov [Novosibirsk poly-  
technic Institute (Novosibirsk Polytechnic Institute).  
Problems of Chemistry in the Structure of Polymers at  
Phase-Relaxation Extension

69

Author: I. A. V. N. Solov'ev, Ye. I. Solov'ev, S. D.  
Solov'ev, V. I. Solov'ev, V. I. Solov'ev, V. I. Solov'ev,  
and M. I. Solov'ev. Isotopic Effect on the Viscosity  
of Deuterioalcohols

73

Author: N. I. I. A. Veremenko, and V. V. Pionov. Investi-  
gation of Surface Tension of Liquid Metal Solutions. I. Sur-  
face Tension of a Lead-Silver System

78

Author: V. I. V. N. Solov'ev, Ye. I. Solov'ev, S. D.  
Solov'ev, V. I. Solov'ev, V. I. Solov'ev, V. I. Solov'ev,  
and M. I. Solov'ev. Continuation Equilibrium of Nickel Ions in  
H<sub>2</sub>O - H<sub>2</sub>O<sub>2</sub> System Glasses

84

Author: V. A. [Institute of Metallurgy (Institute of  
the Chemistry of Alloys)]. Structure of Spontaneous Glass 91  
The author thanks I. N. Malchenko and B. Ye. Sazonov  
for the numerical calculations, and Ye. N. Gur'yants  
and M. N. Akimov for their suggestions.

96

Author: I. E. [Physicochemical Institute Iosif L. Ye. Karpov].  
Calculation of Excess  $\chi$ -Electron Magnetic Susceptibility  
of Certain Molecules Containing the Six-Member Carbon Ring  
with the Aid of the Free Electron Model

102

Author: O. V. and M. N. Bulyareva. [Institute of Chemistry  
and Technology of the USSR Academy of Sciences (Institute of  
Chemical Technology of the USSR Academy of Sciences)].  
Generalizing Dependence of Coordination Numbers of Alkali  
Metal Cations in Aqueous Solutions

102

Author: O. A. [Institute of Polymer Chemistry Institute of  
Chemical Technology of the USSR Academy of Sciences (Institute of  
Chemical Technology of the USSR Academy of Sciences)].  
S. K. Kirov, Sverdlovsk. Form of Surface Tension  
Isobars

111

AVAILABILITY: Library of Congress  
Card 6/6

JA/um/oc  
10-20-60 /c

YEREMENKO, Valentin Nikiforovich

The wetting of refractory compounds with liquid metals, USSR,  
by V. N. Yeremenko and Y. V. Naydich. New York, USJPRS, 1960.  
110 p. illus. graphs, tables. (JPRS: 5006)

Translated from the original Ukrainian: Zmochuvannya ridkymy  
metalamy poverkhen' tugoplavkykh spoluk. kyyiv, 1958.

Bibliography: p. 103-110.

87521

S/073/60/026/002/008/013  
B023/B067

54400

1273 1087, 1274

AUTHORS:

Fesenko, V. V. and Yeremenko, V. N.

TITLE:

Apparatus for Measuring the Surface Tension of Metals at  
High Temperatures by the Method of Maximum Pressure in  
Gas Bubbles

PERIODICAL:

Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 2,  
pp. 198-200

TEXT: The authors designed a vacuum apparatus for determining the surface tension of liquid metals at temperatures up to 1700° by the method of maximum pressure in the gas bubble. The measurements were made by means of beryllium oxide capillary tubes. The scheme of this apparatus is shown in the figure. 1 - vacuum chamber, 2 - resistance furnace, 3 - heat-insulating screens, 4 - metal containing crucible, 5 - ceramic capillary, 6 - manometer with vacuum oil, 7 - regulating capillary tap, 8 - quartz tube, 9 - regulating device, 10 - vacuum pump, 11 - manometric tubes, 12 - gas purification chamber, 13 - furnace with metallic calcium, 14 - liquid-nitrogen cooled trap a) to the auxiliary pump, b) gas. With this

Card 1/2



Apparatus for Measuring the Surface Tension of  
Metals at High Temperatures by the Method of  
Maximum Pressure in Gas Bubbles

87521  
S/073/60/026/002/008/015  
B023/B067

apparatus the authors studied the surface tension of pure liquid mercury,  
tin, copper, and of metals of the iron group. Some measurement results  
for 99.99%-purity metals are given in the table.

metal	t°C	surface tension dyn/cm	
		in helium	in hydrogen
mercury	20	475	475
tin	600	530	530
copper	1250	1290	1300
nickel	1470	1490	1650
cobalt	1520	1620	1590
iron	1650	1430	1400

There are 1 figure, 1 table, and 2 references: 1 Soviet, 1 US, 1 British,  
and 1 German.

ASSOCIATION: Institut metallokeramiki i spetsialnykh splavov AN USSR  
(Institute of Powder Metallurgy and Special Alloys of the  
Academy of Sciences UkrSSR)

SUBMITTED: October 6, 1958

Card 2/02

YEREMENKO, V. N., Doc Chem Sci -- (diss) "Investigation in the field of the physico-chemical foundations of the formation of a metalloceramic body." Kiev, 1960. 32 pp with graphs; (Ministry of Higher and Secondary Specialist Education Ukrainian SSR, Khar'kov Order of Labor Red Banner State Univ im A. M. Gor'kiy); 200 copies; price not given; list of authors' work on pp 30-32 (25 entries); (KL, 25-60, 127)

PHASE I BOOK EXPLOITATION

80V/4025

Yeremanko, Valentin Nikiforovich

Titan i yego splavy (Titanium and Its Alloys) 2d ed., rev. and enl. Kiyev,  
Izd-vo AN USSR, 1960. 499 p. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut metallokeramiki i  
spetsial'nykh splavov.

Ed.: I.N. Frantsevich, Corresponding Member, Academy of Sciences USSR;  
Ed. of Publishing House: I.V. Kisina; Tech. Ed.: O.A. Kadashevich.

PURPOSE: The book is intended for technical personnel, scientific workers,  
plant laboratory staffs, and students of metallurgical schools of higher  
education.

COVERAGE: The monograph is an exhaustive review of investigations on binary systems  
of metal alloys containing titanium and is claimed to be the most complete  
reference book on binary titanium alloys. Data are provided on the structure and  
properties of binary titanium alloys of all systems investigated to date on

Card 1/7

80V/4025

# **Titanium and Its Alloys**

the occurrence of titanium in nature, volume of production, and the methods of producing, compacting and processing metallic titanium and its alloys. World-wide bibliography up to 1958 inclusive is presented. The author expresses his thanks to L.A. Gayevskaya for her assistance. Each article is accompanied by numerous references (total 1813), both Soviet and non-Soviet.

## **TABLE OF CONTENTS:**

From the Editor	3
Preface to the Second Edition	4
Preface to the First Edition	5
Introduction	7
1. Occurrence of Titanium in Nature	18
2. Processing of Titanium Ores	22
3. Preparation of Metal Titanium	27

~~Card 2/7~~

18.6000

77164  
SOV/129-60-1-12/22

AUTHORS: Yeremenko, V. N. (Candidate of Technical Sciences),  
Natanzon, Ya. V. (Engineer)

TITLE: Changes in Electrical Conductivity During the Sintering  
of Metal Powders

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov,  
1960, Nr 1, pp 39-42 (USSR)

ABSTRACT: The authors investigated the changes in the electrical  
resistance of Cu- and Ni-powder compacts as they depend  
on size, compacting pressure, and sintering temperatures.  
The study also concerned changes in the electrical  
conductivity of Cu-Ni and Cu-Mo systems as influenced  
by composition, temperatures, and sintering time. The  
content of impurities in the powders was as follows:  
(1) Cu powder: Fe, 0.07. (2) Ni powder: Fe, 0.052;  
Cu, 0.04; Co, 0.1%. (3) Mo powder: Fe and Ni, traces.  
Specimens (10 cm long, 3 x 3 mm cross section) were  
prepared from these powders. (1) Electrical resistance  
of sintered specimens cooled to room temperatures was

Card 1/04

# Changes in Electrical Conductivity During the Sintering of Metal Powders

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SOV/129-60-1-12/22

measured by means of a Thomson bridge. Error:  $\pm 1 \cdot 10^{-7}$  ohm·cm. Cu and Ni powders (mesh 175 to 250) were compressed under 4, 6, 7, and 10 ton/cm<sup>2</sup> loads and sintered for 3 hours at 900 and 1,000° C respectively (see Fig. 1).

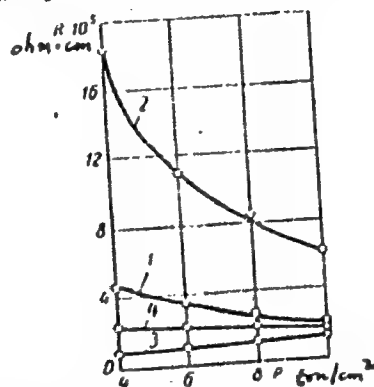


Fig. 1. Electrical resistance of green and sintered specimens versus compacting pressure. (1) Cu before sintering; (2) Ni before sintering; (3) sintered Cu; (4) sintered Ni.

Card 2/104

Changes in Electrical Conductivity During  
the Sintering of Metal Powders

77164

SOV/129-60-1-12/22

Tests showed that the drop of electrical resistance under increased compacting pressure in Cu-powders is primarily due to plastic deformation. The latter can increase the area of contacts to the same extent as sintering for 3 hours at 900° C. The assumption of H. H. Hausner and John H. Dedrick in "The Physics of Powder Metallurgy," 1951 [Ref 1], that thin poorly conductive layers are decisive in changing the resistance is disproved by the authors. (2) The influence of the size of Cu- and Ni-powder particles (150 to 175; 175 to 250 and 250 mesh) on electrical resistance was tested by means of sintered specimens compressed under a load of 6 ton/cm<sup>2</sup>. Results confirmed data given in Ref 1; i.e., electrical resistance of green specimens increases with increasing fineness of powder; however, after sintering, electrical resistance is lower than in coarser powders. (3) Sintering temperatures were studied in the above powders compressed under a 4 ton/cm<sup>2</sup> load for 3 hours at 600, 600, 800, and 900°C(Cu), and 700, 800, 900, 1,000, and 1,100° C (Ni). The effect of sintering temperatures on the

• Card 3/4

Changes in Electrical Conductivity During  
the Sintering of Metal Powders

77164  
SOV/129-60-1-12/22

changes in electrical resistance lends itself to calculations according to the Arrhenius equation. The calculated heat of activation of the sintering process for Cu and Ni equals 17,000 and 34,000 cal/mole respectively. These values conform to the values of the heat of activation in the process of surface self-diffusion of Cu and Ni. (4) The effects of the composition of compacts on electrical resistance in the Cu-Mo system are illustrated in Fig. 7. As seen in that figure the curves deviate negatively from the assumed straight line of additive dependence. Minor deviations from additive values of electrical resistance of sintered Cu-Mo alloys indicate the absence of noticeable solubility of components. The change of resistance of Cu-Ni sintered powders is similar to that of cast alloys. There are 7 figures; 2 tables; and 3 references, 2 Soviet, 1 U.S. as given in the text.

ASSOCIATION: Kiev State University (Kievskiy gosudarstvennyy universitet)  
Card 4/14



80987

S/180/60/000/03/021/030

E193/E383

V.I. and Tay Shou-Vey (Kiyev)

18.8100

AUTHORS:

Yeremenko, V.N.,

Nizhenko,

Surface Tension of Liquid Beryllium

TITLE:

Surface Tension

PERIODICAL:

Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 3, p 116 (USSR)

ABSTRACT:

Large grain size and the columnar structure of cast beryllium cause difficulties in machining of this metal. Since addition of surface-active substances is one of the methods used in grain refining, determination of the surface properties of beryllium and its alloys is of considerable practical importance. Taylor (Ref 2), using a semi-empirical formula, calculated the surface tension of beryllium at its melting point to be  $1.620 \text{ erg/cm}^2$ . The object of the investigation described in the present paper was to determine surface tension of beryllium experimentally, using the sessile drop method. The measurements were made at  $1500^\circ\text{C}$  on refined beryllium, 99.98% purity, melted in vacuum ( $5 \times 10^{-5} \text{ mm Hg}$ ) in beryllia crucibles. The density of beryllium at  $1500^\circ\text{C}$  was determined from the dimensions of the drop, photographed at that temperature and from the weight of

Card1/3

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S/180/60/000/03/021/030  
E193/E383

### Surface Tension of Liquid Beryllium

the metal immediately after the experiment and was found to be  $1.42 \pm 0.04$  g/cm<sup>3</sup>. The surface tension of beryllium at 1500 °C determined in this way was  $1100 \pm 35$  erg/cm<sup>2</sup>. The calculated value due to Taylor is 30% higher than that determined experimentally. If the change of density between the melting point of beryllium and 1500 °C is taken into account, this difference is reduced to about 25% and becomes even smaller if the temperature dependence of the surface tension is also taken into consideration. However, even then the calculated and the experimental values differed by about 10%. Although the present authors were unable to determine the oxygen content of beryllium after their measurements, they believe that the quantity of oxygen absorbed from the beryllia crucible could not be excessively high; if it is assumed that the effect of oxygen on surface tension of beryllium is similar to that on the surface tension of other metals, the value obtained by the present authors is lower than the true value but the error probably

Card2/3

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S/180/60/000/03/021/030

E193/E383

Surface Tension of Liquid Beryllium

does not exceed 100 - 150 erg/cm<sup>2</sup>.  
There are 5 Soviet references.

SUBMITTED: December 16, 1959

Card 3/3

GRIGOR'YEVA, V.V., YEREMENKO, V.N.

Structure and properties of materials on a silicon carbide base;  
materials prepared by siliconizing graphite. Vop. por. mat. 1  
prochn. mat. no.8:38-48 '60. (MIRA 13:8)  
(Silicon carbide)  
(Powder metal processes)

BEYNISH, A.M., YEREMENKO, V.N.

Structure and properties of materials on a silicon carbide base;  
materials prepared by slip casting. Vop. por. met i prochn. mat.  
no.8:49-54 '60. (MIRA 13:8)

(Silicon carbide)  
(Powder metal processes)

ORIGOR'YEVA, V.V., YEREMENKO, V.N.

Structure and properties of materials on a silicon carbide  
base; preparation and properties of materials not containing  
free carbon. Vop. por. met. 1 prochn. mat. no.8:55-60 '60.  
(MIRA 13:8)

(Silicon carbide)  
(Metal powder products)

GRIGOR'YEVA, V.V., YEREMENKO, V.N., LUK'YANETS, A.P.

Structure and properties of materials on a silicon carbide base;  
investigating changes of structure and phase constitution  
during heating and soaking at high temperatures. Vop. por. met.  
i prochn. mat. no.8:61-65 '60. (MIRA 13:8)  
(Silicon carbide)  
(Metal powder products--Testing)

S/078/60/005/009/031/040/XX  
B017/B058

AUTHORS: Yeremenko, V. N. Listovnichiy, V. Ye.

TITLE: The Influence of Oxygen Partial Pressure on the Dependence of  
the Electrical Resistance Upon the Composition in the  
✓ MgO - Cr<sub>2</sub>O<sub>3</sub> System ✓

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9,  
pp. 2056-2060

TEXT: Specimens of various composition were produced from MgO and Cr<sub>2</sub>O<sub>3</sub>  
in a БННН-120 (VNIIO-120) kryptol furnace in a temperature range of from  
1750° to 1780°C. The resistivity of these specimens was determined. The  
apparatus for measuring the electrical resistance in vacuum is shown  
schematically in Fig. 1. The resistivity of the specimens in air and in a  
vacuum of from 1 to 2.10<sup>-5</sup> mm Hg at temperatures of up to 1000°C was  
measured by the probe method. The temperature dependence of resistivity  
is illustrated in Figs. 2 and 3 by the coordinate  $\log \rho = f(1/T)$ . The  
dependence of resistivity on the composition of the specimens was ✓

Card 1/2



The Influence of Oxygen Partial Pressure  
on the Dependence of the Electrical  
Resistance Upon the Composition in the  
MgO - Cr<sub>2</sub>O<sub>3</sub> System :

S/078/60/005/009/031/040/XX  
B017/B058

determined at 1000°C and 600°C in air and in vacuum. The results are shown in Fig. 4. The temperature dependence of the resistivity is almost equal for measurements in air and in vacuum. A relatively small minimum was observed at 52 to 58 mol% Cr<sub>2</sub>O<sub>3</sub> and maxima at 50 and 66 mol% Cr<sub>2</sub>O<sub>3</sub>. The

authors mention V.F. Smachnaya and P. Ya. Sal'dau. The energy of activation (E) of the current carrier was calculated from the temperature coefficient of resistivity. Comparatively high energies of activation were calculated for specimens with a Cr<sub>2</sub>O<sub>3</sub> content of 52 to 65 mol%.

The measurement of the electrical conductivity of oxide systems can be applied generally as a very sensitive method for physico-chemical studies at various temperatures and pressures. There are 5 figures and 11 references: 5 Soviet, 2 US, 3 German, and 1 Polish.

SUBMITTED: June 30, 1959

Card 2/2

84216  
S/078/60/005/010/011/021  
B004/B067

18.1153 only. 2308

AUTHORS: Yeremenko, V. N., Tret'yachenko, L. A., Yakhimovich, R. I.

TITLE: Melting-point Diagram of the System Tantalum - Vanadium ✓

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 10,  
pp. 2290-2293

TEXT: The authors studied the structure and properties of tantalum - vanadium alloys to determine the phase diagram of this system. The two components were fused in an arc furnace in argon atmosphere at 300 - 400 torr. The alloys were homogenized by remelting them 6 to 7 times, viz., alloys of up to 50 atom% Ta at 1600°C, and of more than 50 atom% Ta at 1800°C. They were homogenized in vacuum of at least  $1 \cdot 10^{-4}$  torr in an MBH-3M (MVP-ZM) high-frequency furnace. The microstructure of the alloys (Fig. 1) showed that in the system Ta - V a continuous series of solid solutions is formed, which was confirmed by X-ray examinations. All alloys had a body-centered lattice whose parameter steadily increased from 3.02 kX (pure vanadium) to 3.29 kX (pure tantalum) (Fig. 2). Microhardness

Card 1/2

Melting-point Diagram of the System  
Tantalum - Vanadium

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B004/B067

was determined by means of a ПМТ-3 (PMT-3) apparatus (Fig. 3). It varied according to the rule formulated by Kurnakov-Zhemchuzhnyy for continuous series of solid metal solutions. The solidus line (Fig. 4) was determined by heating the samples fastened between electrodes with a current passing through them. In the circuit, an OCY-20 (OSU-20) transformer and a THH-130 (TNN-130) buncher were used. The temperature was measured with an ON-48 (OP-48) pyrometer. As is shown by Fig. 4, the temperature at the beginning of the melting process rises steadily from 1800°C (pure vanadium) to 2950°C (pure tantalum). At lower temperatures (1000 - 1400°C), the formation of a small amount of a new phase was observed, which is further investigated. There are 4 figures and 3 references: 2 Soviet and 1 US. ✓

SUBMITTED: July 27, 1959

Card 2/2

83666

S/073/60/026/004/004/008  
B016/B054

18.6100 only 2308

AUTHORS: Yeremenko, V. N. and Nizhenko, V. I.

TITLE: The Influence of Carbon<sup>1</sup> on the Surface Tension of Liquid  
Cobalt and Nickel<sup>1</sup> As Well As Their Interface Tension  
With Aluminum Oxide<sup>1</sup>

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 4,  
pp. 423-428

TEXT: As there are no data in publications on the influence of carbon on the surface tension of liquid cobalt and nickel, the authors measured this tension in liquid metals and alloys and the wetting angles at high temperatures (1550-1600°C) in vacuo or in protective gas. Inductive heating by much improved apparatus (as compared with Ref. 1) was used for this purpose. Figs. 1 and 2 show this apparatus schematically. The vacuum was produced by a vacuum pump of the type УВЛ-100 (TsVL-100) and a forepump of the type РВН-20 (RVN-20). Table 1 compares the authors' data for the surface tension with data in publications (Refs. 4-6). Fig. 3 shows the isothermal line of the surface tension in Ni-C alloys

Card 1/3

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The Influence of Carbon on the Surface Tension of S/073/60/026/004/004/008  
Liquid Cobalt and Nickel As Well As Their Inter- B016/B054  
face Tension With Aluminum Oxide

at 1550°C, and Fig. 4 the isothermal line of C-adsorption in liquid nickel. In weakly surface-active substances, the isothermal line of Fig. 3 follows well Shishkovskiy's equation. The curve of Fig. 4 was obtained by differentiation of this equation and introduction of the values of  $\frac{\partial \sigma}{\partial C}$  in Gibbs's adsorption equation for ideal systems. The isothermal line of the surface tension of Co-C alloys is shown in Fig. 5. Adsorption increases linearly with the concentration within the concentration range investigated. From a comparison of the influence of carbon on the surface tension of nickel and cobalt, the authors conclude that carbon in liquid nickel is more surface-active than in liquid cobalt. Finally, the authors calculated the adhesion energy  $w_a$  and the tension  $\sigma_{\text{solid-liqu}}$  at the interface between liquid metal and solid aluminum oxide for Ni-C and Co-C alloys (Table 2). There are 5 figures, 2 tables, and 12 references: 4 Soviet, 1 British, and 1 German.

Card 2/3

83666

The Influence of Carbon on the Surface Tension of S/073/60/026/004/004/008  
Liquid Cobalt and Nickel As Well As Their Inter- B016/B054  
face Tension With Aluminum Oxide

ASSOCIATION: Institut metallokeramiki i spetsssplavov AN USSR (Institute  
of Powder Metallurgy and Special Alloys of the AS UkrSSR)

SUBMITTED: February 24, 1959

Card 3/3

86457

18.7200

S/073/60/026/005/009/019  
B004/B063

AUTHORS: Yeremenko, V. N. and Nizhenko, V. I.

TITLE: Wettability of Aluminum Oxide by Means of Liquid Tin-Titanium Alloys and Their Interfacial Stress on the Boundary With Aluminum Oxide

PERIODICAL: Ukrainskiy khimicheskii zhurnal, 1960, Vol. 26, No. 5, pp. 605-608

TEXT: In a previous work (Ref. 2), the authors had found that an admixture of 0.083 % by weight of Ti lowers the surface tension of tin at 300°C from 539 ergs/cm<sup>2</sup> to 155 ergs/cm<sup>2</sup>. An Sn-Ti alloy containing 0.2% of Ti has a wetting angle that is much smaller than 90°. This may be of practical importance when soldering ceramics with ceramics or metals. From this point of view the authors have studied the effect of adding Ti to Sn on the stress on the interface between the Sn alloy and solid oxide (Al<sub>2</sub>O<sub>3</sub>).

Using the data of Ref. 2 on the surface tension  $\sigma_{liq}$  of Sn-Ti alloys, the

Card 1/0 3

Wettability of Aluminum Oxide by Means of  
Liquid Tin-Titanium Alloys and Their Inter-  
facial Stress on the Boundary With Aluminum Oxide

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B004/B063

wetting angle  $\theta$ , and the surface tension  $\sigma_{sd}$  of solid  $Al_2O_3$  which was  
set equal to  $1050 \text{ ergs/cm}^2$  according to Ref. 4, the interfacial stress was  
calculated from the relation  $\sigma_{int} = \sigma_{sd} - \sigma_{liq} \cos \theta$  (1). At  $300^\circ\text{C}$ , the  
following values were obtained for an increase in Ti concentration  $C_i$   
 $C_i$ , g-atom/ $1 \cdot 10^4$   $\sigma_{liq}$ , erg/ $\text{cm}^2$   $\theta$ , degree  $\sigma_{int}$ , erg/ $\text{cm}^2$

0.00	539	140	1465
12.86	292	149	1300
48.53	155	148	1190

This effect was ascribed to a reaction with oxygen. Though the concentra-  
tion of  $O_2$  at  $10^{-4}$  mm Hg does not affect the surface tension of Sn, the Ti  
admixture acts as a getter and adsorbs oxygen which, in turn, lowers the  
surface tension. The iridescence observed is also indicative of a reaction  
with oxygen. Experiments with a Ni-Ti alloy in hydrogen have shown that

Card 2/3



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Wettability of Aluminum Oxide by Means of  
Liquid Tin-Titanium Alloys and Their Inter-  
facial Stress on the Boundary With Aluminum Oxide

S/073/60/026/005/009/019  
B004/B063

Ti does not affect the surface tension of Sn, but lowers it immediately as soon as oxygen is added. The isothermal line of Ti adsorption at 300°C on the interface was calculated by graphical differentiation of the function  $\sigma_{int} = f(c)$ , where  $c$  denotes the concentration of Ti (see Fig. 2). Assuming that the maximum of the isothermal line constitutes a saturation point, the thickness of the adsorbed layer was found to be 2.13 Å.

Text to Fig. 2: 1 :  $\Gamma$  g-atom/cm<sup>2</sup> · 10<sup>10</sup>; 2: Ti, g-atom/1.10<sup>4</sup>.

There are 2 figures, 1 table, and 10 references: 5 Soviet, 3 US, and 2 German.

ASSOCIATION: Kiyevskiy gosuniversitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: February 24, 1959

Card 3/03

YEREMENKO, V.N.; NAYDICH, Yu.V.; NOSONOVICH, A.A. (Kiyev)

Surface activity of oxygen in liquid copper-oxygen alloys. Zhur.  
fiz.khim. 34 no.5:1018-1020 My '60. (MIRA 13:7)

1. Akademiya nauk USSR. Institut metallokeramiki i spetsial'nykh  
splavov i Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.  
(Copper--Oxygen alloys) (Surface tension)

81566

S/076/60/034/06/05/040  
B015/B061

5,4400

AUTHORS:

Yeremenko, V. N., Naydich, Yu. V., Nosonovich, A. A. (Alyev)

TITLE:

The Interface Activity<sup>b</sup> of Oxygen in Liquid Metal - Solid  
Oxide Systems

PERIODICAL:

Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 6,  
pp. 1186-1189

TEXT: The wettability of the surface of aluminum oxide and magnesium oxide with copper - oxygen melts was examined (Table, composition of melts from 0.0 to 3.4 at% oxygen). The degree of wetting was determined from the angle of contact (which depends on the interface surface energies). The angle of contact was measured photographically on drops of the metal melt resting on the oxide, in a special vacuum apparatus (Ref. 5) in argon atmosphere at 1150°C. Experiments with the system  $\text{Cu(O}_2\text{)}\text{-Al}_2\text{O}_3$  showed that the oxygen present in copper greatly increases the wettability of the oxide with copper. With the help of the Gibbs equation it was calculated that the oxygen adsorption on the interface.

Card 1/2

The Interface Activity of Oxygen in Liquid  
Metal - Solid Oxide Systems

81566  
S/076/60/034/06/05/040  
B015/B061

of the metal melt- $\text{Al}_2\text{O}_3$  passes through a maximum at an oxygen content of about 1 at% (Fig. 4). Data on the excess concentration of the oxygen bound to the surface of the oxide indicate that the latter is adsorbed at lattice junctions where the aluminum ions are, causing the adsorption of an oxygen ion on an aluminum ion. Similar statements were made with the system  $\text{Cu}(\text{O}_2)\text{-MgO}$ , where the wettability of copper on magnesium oxide by oxygen is not so greatly increased as in the case of  $\text{Al}_2\text{O}_3$ . There are 4 figures, 1 table, and 8 references: 3 Soviet, 3 American, 1 German, and 1 British.

ASSOCIATION: Akademiya nauk USSR Institut metallokeramiki i spetsial'nykh splavov (Academy of Sciences UkrSSR, Institute for Powder Metallurgy and Special Alloys). Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: June 30, 1958

Card 2/2

32616

S/137/61/000/011/072/123  
A060/A101

18.1285

AUTHORS: Yeremenko, V.N., Tolmacheva, Z.I.

TITLE: On triangulating the system titanium-carbon-nickel

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 11, 1961, 25, abstract  
11Zh152 ("Poroshk. metallurgiya", 1961, no. 2, 21-29, English  
summary)

TEXT: To determine the triangulation of the system Ti-C-Ni, alloys were investigated whose compositions lie upon the intersection of the sections TiC-Ni and Ti<sub>2</sub>-Ni-C, TiNi-C, TiNi<sub>3</sub>-C. The solubility of Ni in TiC in the solid state was determined. The alloys with composition Ti<sub>2</sub>Ni, TiNi, and TiNi<sub>3</sub> were preliminarily smelted in an arc furnace, and then were alloyed with graphite of high purity. The investigation was carried out by the methods of metallographic and X-ray analyses. It was demonstrated that the system Ti-C-Ni is quasi-binary, and a diagram was constructed for the system TiC-Ni. The Ni solubility in TiC in the solid state constitutes 0.7-0.8% and does not vary with the temperature in the interval 1,000-1,280°C. There are 9 references.  
[Abstracter's note: Complete translation]

Z. Rogachevskaya

Card 1/1

S/137/62/000/001/122/237  
A052/A101

AUTHORS: Yeremenko, V.N., Tolmacheva, Z.I.

TITLE: On the triangulation of the system titanium-carbon-chromium

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 1, 1962, 6, abstract 1142  
(Poroshk. metallurgiya, no. 2, 1961, 30 - 34, English summary)

TEXT: For determining the triangulation of the system Ti-C-Cr, alloys of Ti with  $Cr_3C_2$  and  $Cr_7C_3$  and of TiC with Cr were studied. The investigation was carried out by the method of metallographic analysis. It is shown that the TiC-Cr section in the Ti-C-Cr system is a quasibinary one. There are 8 references. See also RZhMet, 1961, 11Zh152.

Z. Rogachevskaya

[Abstracter's note: Complete translation]

Card 1/1

33798  
S/137/62/000/001/043/237  
A060/A101

15.2240

AUTHORS: Yeremenko, V. N., Velikanova, T. Ya.

TITLE: On triangulating the system titanium-carbon-molybdenum

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 36, abstract 10265  
("Poroshk. metallurgiya", 1961, no. 3, 20 - 24 [English summary])

TEXT: An analysis of the thermodynamical data on the carbides of Mo and Ti has made it possible to assume that the system Ti-C-Mo should be susceptible to triangulation along the sections TiC-Mo, TiC-Mo<sub>2</sub>C, TiC-MoC. The experimental verification of this assumption was carried out upon the alloys of these binary systems, prepared by pressing the mixtures and sintering at 1,850°C for 5 hours. X-ray structure, durometric, and metallographic analyses have uncovered in the sintered alloys the presence of only two phases: Mo and TiC. A conclusion is drawn as to the pseudobinary eutectic nature of the Mo-TiC system and the results of investigations of the Mo-Ti-C diagram by other authors are discussed.

R. Andriyevskiy

[Abstracter's note: Complete translation]

Card 1/1

YEREMENKO, V.N.

Thermodynamic properties of the components of liquid  
solutions in the system aluminum - zinc: Zhur.fiz.khim.  
34 no.7:1495-1502 J1 '60. (MIRA 13:7)

1. Kiyevskiy gosudarstvennyy universitet im. T.G.Shevchenko.  
(Aluminum) (Zinc) (Electromotive force)



YEREMENKO, V.N., otv. red.; FRANTSEVICH, I.N., red.; SAMSONOV, G.V., red.; FEDORCHENKO, I.M., red.; PISARENKO, G.S., red.; GRIGOR'YEVA, V.V., red.; NIZHENKO, V.I., red.; POKROVSKAYA, Z.S., red. izd-va; LISOVETS, A.M., tekhn. red.

[Surface phenomena in metals and alloys and their role in powder metal processes] Poverkhnostnye iavleniia v metallakh i splavakh i ikh rol' v protsessakh poroshkovoii metallurgii. Kiev, Izd-vo Akad. nauk USSR, 1961. 213 p. (MIRA 15:4)

1. Akademiya nauk URSR. Kiev. Instytut metalokeramiki i spetsial'nykh splaviv. 2. Kiyevskiy gosudarstvennyi universitet im. T.G. Shevchenko (for Yermenko). (Powder metal processes) (Metals)

1.1600

15

33804  
S/137/62/000/001/059/237  
A060/A101

AUTHORS: Yeremenko, V. N., Lesnik, N. D.

TITLE: On saturating porous titanium carbide with cobalt, nickel, and their alloys with copper

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 39, abstract 10294 ("Poroshk. metallurgiya", 1961, no. 1, 43-49, English summary)

TEXT: TiC ingots fabricated by sintering freely poured powders at 1,500°C in vacuum, were saturated at high vacuum of  $\sim 10^{-5}$  mm Hg by Ni, Co and their Cu-alloys. Pure nickel and cobalt react very vigorously with TiC and it is impossible to carry out the saturation in practice; by the use of saturated solutions of Ni and Co with TiC the saturation of porous billets proceeded safely, but so rapidly that it was not possible to study the laws of kinetics. Only with the use of alloys of Cu - (15-20%) Ni (Co) did one manage to plot the saturation isotherms, which confirmed the parabolic dependence. The saturation activation energy was estimated. It is noted that the limiting process of the saturation is, in the majority of cases, not the viscous flow of the molten metal, but its spreading over the surface of the solid framework. R. Andriyevskiy  
[Abstracter's note: Complete translation]

Card 1/1

YEREMENKO, V.N. (Kiyev); NIZHENKO, V.I. (Kiyev); NAYDICH, Yu.V. (Kiyev)

Surface tension of certain molten intermetallides. Izv. AN.  
SSSR. Otd. tekhn. nauk. Met. i topl. no.3:150-154 My-Je '61.  
(MIRA 14:7)

1. Institut metallokeramiki i spetsial'nykh splavov AN USSR.  
(Surface tension) (Intermetallic compounds)

36438

S/137/62/000/003/074/191  
A006/A101

15.2240  
AUTHORS:

Yeremenko, V.N., Tolmacheva, Z.I.

TITLE:

Solubility of chromium and chromium carbides in titanium carbide in solid state

PERIODICAL:

Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 44, abstract 36309  
("Poroshk. metallurgiya", 1961, no. 4, 31 - 36, English summary)

TEXT:

The authors analyzed the possibility of dissolving Cr and Cr carbides in Ti carbide, based on notions of deficiencies in the TiC lattice. Alloys TiC-Cr, TiC-Cr<sub>3</sub>C<sub>2</sub>, TiC-Cr<sub>23</sub>C<sub>6</sub>, TiC-Cr<sub>7</sub>C<sub>3</sub> were prepared by methods of hot pressing and sintering of the pressed blanks, with subsequent homogenizing annealing. A metallographical analysis of the alloys obtained has shown that at up to 6 - 6.5 weight percent Cr, all the alloys are single-phase ones, i.e., solubility of Cr and Cr carbide in TiC on conversion to the Cr content is equal and does not depend on the temperature in the investigated range. It is shown that at temperatures up to about 0.5 T<sub>melting</sub> of a refractory component, the solubility of metal in metallic compounds changes insignificantly in the majority of cases.  
[Abstracter's note: Complete translation]

R. Andriyevskiy

Card 1/1

15-2400

30895  
S/180/61/000/005/005/018  
E111/E135

AUTHORS: Yeremenko, V.N., and Lesnik, N.D. (Kiyev)

TITLE: Kinetics of the impregnation of porous iron and nickel with liquid lead and silver

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh naul, Metallurgiya i toplivo, no.5, 1961, 43-50

TEXT: Impregnation of porous solids with liquid metals is widely applied in cermet production. In the present investigation an attempt is made to find the influence of temperature, extent of porosity and pore size on the kinetics of impregnation in systems in which no interaction occurs (Fe-Pb, Fe-Ag) and with limited solubility of the porous metal in the impregnating liquid (Ni-Pb, Ni-Ag). The latter conditions were interesting in that the decrease in free energy on impregnation was made up of wetting-energy effects (as in the former conditions) and of energy of mixing when the solution is formed. The apparatus used is shown in Fig.1. (1 - quartz reaction-vessel; 2 - water-cooled brass cap; 3 - device for vertical movement of the specimen;

Card 1/ 04

Kinetics of the impregnation of ... <sup>30795</sup>  
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E111/E135

4 - quartz-sheathed thermocouple; 5 - porous sample; 6 - crucible with molten metal; 7 - ceramic cylinder with a heater; 8 - nickel and molybdenum screens; 9 - magnesite support for resistance furnace; 10 - electric leads). The rate of penetration was found from the rate of the weight increase of the specimen, experiments having shown that the penetration front was a practically straight surface perpendicular to the direction of penetration. The specimens were made from powders: electrolytic iron powder was annealed at 800-900 °C for 90 minutes in hydrogen and then screened; grade HΠ-1 (NP-1) nickel powder was used. Sintering was carried out on freely poured powders in quartz tubes, at temperatures and pressures depending on the size grading. For studying the effect of temperature on penetration rate 67-69% porosity specimens were used. Nickel specimens had 62-64% porosity. For impregnation, 99.99% Ag silver and "analytical" purity lead were used, the latter being melted and repeatedly filtered under vacuum before use. The results were found to be satisfactorily represented by:

$$(\Delta m/D^2)^2 = K\tau \quad (1)$$

Card 2/14

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E111/E135

Kinetics of the impregnation of ...

where:  $\Delta m$  is the weight gain of the specimen;  $\tau$  is impregnation time;  $D$  is the diameter. From the temperature effect the activation energy was found to be 43 kcal/g.atom for iron-lead, and 93 for iron-silver. The work showed that the rate of impregnation increases with increasing pore size and with increasing extent of porosity if the grain size of the powder is maintained. Because of the very rapid impregnation of the porous solid the rate of impregnation by pure metal and saturated solution is the same. Comparison of the activation energy of the impregnation process with that of the viscous flow of the penetrating liquid showed substantial differences; the values differ for the impregnation of different solids with a given liquid. On the basis of this and the variation of wetting angles with temperature the authors propose that the controlling factor in the impregnation of porous iron and nickel with liquid lead and silver is not viscous flow of the liquid in capillaries but the spread over the solid surface.

There are 7 figures, 4 tables and 7 references: 1 Soviet-bloc, 1 Russian translation from non-Soviet publication, 4 English and

Card 3/4

Kinetics of the impregnation of ....

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E111/E135

1 German. The English language references read as follows:

Ref.2: E.W. Washburn. Dynamics of the capillary flow.

Phys. Rev., 1921, 7 (3), 273.

Ref.3: K.A. Semlak, S.W. Spenser, F.H. Rhines. Rate of capillary  
rise of liquid metal in a higher melting metal powder  
compact. J. Metals, 1957, 9 (1/2), 63.

Ref.6: H.J. Fisher, A. Phillips. Metals, 1954, 6 (9), 1060.  
Viscosity and density of liquid lead-T, U and antimony-  
cadmium alloys.

Ref.7: K.A. Semlak, F.N. Rhines. The rate of infiltration of  
metals. Trans. Met. Soc., AIME, 1958, 212 (3), 325.

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SUBMITTED: July 14, 1960

Card 4/04



S/180/61/000/006/010/020  
E073/E535

AUTHORS: Yeremenko, V.N. and Naydich, Yu.V. (Kiev)  
TITLE: Surface tension of molten rhodium and palladium

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye  
tekhnicheskikh nauk. Metallurgiya i toplivo.  
no.6, 1961, 100-101

TEXT: The authors determined the surface tension and the density of rhodium and palladium by the large drop method in a vacuum of  $5 \times 10^{-5}$  mm Hg at the fusion temperatures, i.e. 1554 °C for Pd and 1966 °C for Rh. In the experiments a high temperature furnace with an open 1 mm diameter tungsten wire winding was used. The cup and base used for the experiments were made of beryllium oxide in the case of Rh and of aluminium oxide in the case of Pd. The diameter of the top edge of the cup was about 15 mm. The surface tension and the volume of the drop were determined by photographing the molten drops and measuring their maximum diameter, height and angle of contact. At the fusion temperature (1966 °C) Rh has a density of  $10.05 \pm 0.3 \text{ g/cm}^3$  and a surface tension of  $1940 \pm 50 \text{ erg/cm}^2$  (wherein the errors in Card 1/2

Surface tension of molten

S/180/61/000/006/010/020  
E073/E535

the measured density are taken into consideration). Pd at the fusion temperature (1554°C) has a surface tension of  $1470 \pm 10$  erg/cm<sup>2</sup> and the density estimated according to empirical formulae was 10.7 g/cm<sup>3</sup>. There are 1 table and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference reads as follows: Ref.4: Bashfort H.A. An attempt to test the theories of capillary action. Cambridge. 1883

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov  
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SUBMITTED: January 18, 1961

Card 2/2